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divided into two bundles with the tips of the leaflets lying in the same direction. The butt ends of the two bundles are laid together and roughly fastened with a leaflet. Commencing about 4 inches from the proximal ends of the butt leaf bundles, leaflet 1 from the left bundle is passed to the right, leaflet 1 from the right bundle is passed to the left over leaflet 1 of the left bundle. This process is continued until all the leaflets have been crossed over. The leaflets are then plaited in closed leaf check and the finishing edge made with the *ibiibinga* technique. The two bundles containing the butt ends of the leaves are bound together with transverse turns of sennit, the completed lashing having buried commencement and finishing ends (pl.3,*A*,*a*). The technique is the same as that of the midrib-handle fan shown in figure 17 save that the handle is composed of the butt ends of the leaflets bound together.

Fan C8189 (*iti yaeyae*) is a smaller fan made by the same technique. It commences with check plaiting, goes on to twilled twos, twilled threes, and finishes with rows of check. The fan is 13½ inches long, 6 inches wide at the top, which is straight instead of curved as with the other two fans. The handle is bound with nine turns of common string.

CORDAGE

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Various materials are used as cords. Readily obtainable materials that serve a need of the moment are coconut leaflets and strips of fiber from the coconut midrib or from dried *pulaka* stalks. These are used without preparation and discarded when no longer necessary. More permanent cordage is made from the husks of the coconut and from bark of the *wau* tree. *Wao*[6] fiber is used for fishlines where quality is more important than quantity; coconut fiber is used for every variety of cord where strength and quantity are desired. Human hair is occasionally used to make short cords by which valuable ornaments (*yana*) are hung from the neck.

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Wao fiber is prepared for the finer fishlines as follows:

Bark is peeled (*teewole*) by a man from a small branch or sapling (*yuli*) of the *wau* tree and rolled up into a bundle (*pakai*). A woman proceeds with the task. She puts the bark in a wooden bowl and covers it with fresh water. Then she places a strip of bark on a flat surface, a special board or the blade of a canoe paddle, with the inner surface of the bark lying downward on the board, and scrapes (*tulu*) away the green outer bark with a shell until only the white inner bark is left. When all the strips of bark have been scraped, they are braided together at the ends by the man or woman to make a bundle of strips termed *titi wao*. This *titi* is hung in the sun for about two weeks to bleach. At the end of this time, each strip is rubbed with a half coconut shell until it is soft and pliable. Each strip is then shredded (*wayiwayi*) into narrow widths (*yako*) which are ready to be made into fishline.

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Appliances used in *wao* bark preparation are:

Scraping board C8047 (*papa tulu wao*) is a board of *puapua* wood, 26 inches long, 4 inches wide, and 1¼ inches thick. The scraping surface has a slight transverse convexity.

Shell scraper C8046 (*hatl*) is a highly polished and smoothed black-lipped pearl shell; greatest length 3⅛ inches, greatest width 3⅛ inches, thickness at the hinge ⅝ inch, thickness at the lip 1/16 inch.

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Hank of fiber C8132 (*titi wao*) is a semi-bleached hank of prepared *wao* bark from which line may be made. Thirty-one strips of bark ranging in length from 3 feet to 6

[6] The tree is *wau*; fiber prepared from its bark, *wao*.

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feet 6 inches are braided together at one end. Braiding commences with three strips of bark. After braiding for 2½ inches, one strip (ply) is dropped and another added. After two more twists of the braiding, a second strip is dropped and another added to take its place. The braiding continues thus, dropping one and adding another strip until 28 plies are dropped. The braiding of the final three plies is stoppered by tying the two outer plies together with the first part of a reef knot.

Sennit fiber (*laukawa*) is prepared by macerating either the green or mature husk of the coconut in salt water. The coconut named *niu pulu venu* is preferred for fiber, but any nut may be used if this is not available.

The husk is either buried in the wet sand on the beach or else placed in a basket which is submerged in shallow water. The husk is left until the interfibrous material is decayed (*papala*). One to two months is a usual time, but burial up to six months or more does not harm the fibers. On removal from the salt water, the husk is pounded (*tuki*) on the beach to separate the decayed matter from the fibers. Any wood or stone serves as an anvil and a piece of wood as a mallet. After being thoroughly beaten, the fiber is washed in the sea and dried in the sun.

Before cordage is made, the bundle of fibers (*laukawa*) is sorted (*unu*) and the short, fluffy, thin fibers (*wunga*) are thrown away. The remaining fibers (*pulu kawa*) are separated into two types: long single fibers are picked out to be made into cordage termed *uta* used for especially strong fishlines and canoe lashings; the remaining fibers are divided into hanks (*amo*) of 10 to 15 fibers each, twisted at one end to hold the fibers together.

Twisting

Twisted cords are made of *uto* and coconut fibers. A fine two-ply twist of *uto* termed *aiaala* is made for the lashings of composite pearl-shell fishhooks. The operation is known as *wilo:*

The worker takes two single threads of *uto* and rolls them separately on the sole of the foot (*papa vae*) with the palm of the hand (*papa lima*). At the finish of each forward and backward rub a slight twist is given to the thread by a sideways motion of the hand. Two twisted threads are laid together and twisted into a single cord by a forward and backward movement of the hand. The plies are termed *tauvua*. Strands are added to the shortening ply by direct overlapping.

Thicker cords varying from 1 to 3 mm in diameter are made from *uto* fiber in two- or three-ply twist, and used as snoods, secondary snoods, and bonito lines.

Two-ply sennit (*uka vae*) or three-ply sennit (*uka tautolu*) is used exclusively in lashing together rafters and purlins in the house framework and for lashing roof sheets to the rafters. Separate strands (*amo*) are twisted separately on the sole of the foot and then twisted together. Strands are added by direct overlapping on the shortening ply. Two-ply *uka* is about 3 mm thick, three-ply about 5 mm.

Braiding

The material used for braided cords is invariably sennit fiber. This braiding is either three-ply for fishlines or lashing lines, or five-ply for

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sennit malos. Four-ply braid is not used for cordage. Braided sennit is termed *kawa*. Sennit made from the selected, long pieces of fiber is *kawa unu*; from unselected strands (*amo*), *kawa wili*. Ordinary three-ply braiding which produces a fairly long, loose braid is termed *kawa wili yaeyae* and is used for ordinary anchor line (*kawatau*) or fishline. Careful three-ply braiding, in which each twist of the plies is pulled very tight to form a close, round braid, is termed *kawa wili tuki*; when made of the long strands (*unu*), it produces especially strong braid used for strong fishlines and canoe lashings.

Braiding is always done toward the body. The commencement end of the plies is knotted and tied to a stake set in the ground before the worker or else coiled round the toe (*iko ki te mangamanga tae*). In three-ply braid, the outside plies are brought over the middle ply in succession, each ply taking in turn the middle position. A shortening or thinning ply is reenforced by direct overlapping on the specific ply affected or else by the addition of a new strand from below, the short end of which is folded back over the middle ply (fig.18,*b*). When it is temporarily abandoned, the braiding is stoppered by twisting plies together or by tying the two outer plies together with an overhand knot. Braiding is permanently finished by gradually reducing the size of the strands until they are very thin and then rolling the three plies together on the sole of the foot to produce about 3 inches of three-ply twist. Shreds of fiber (*wuluwulu*) left on the cord after braiding is finished are carefully cut off with a knife (*taku*) to give a smooth, neat appearance to the cord.

[804] Finished cord is measured by stretching it from tip to tip of outstretched arms across the chest. One such measurement is equal to a fathom (*ngawa*). When the worker has made a sufficient number of *ngawa* for his purposes, he winds the cord into a coil of fathom loops and stores it until needed. Lengths of cord for canoe lashings are made fairly short because the cord must be used uncoiled when lashing through holes in the canoe hull. Working coils for house lashings are made by winding the sennit over the back and palm of the hand. The sennit is taken from the hand, the free end is wound several times round the middle of the coil and fastened with half hitches. The commencement end is pulled from the center of the coil and the lashing started with this end. As the lashing proceeds the coil unwinds itself, but the coiling prevents the sennit from becoming tangled and hard to use.

Examples of three-ply braided cords for various purposes are:

Anchor line C8198 (*kawa tau*): three-ply braid, 6 mm thick, 11 mm wide. The plies thin down to 4 × 2 mm at the finishing end and are twisted into two plies (two plies being twisted as a single element) for 2½ inches and knotted.

Other lengths of braid used as deep-sea fishlines and anchor lines (C8197, C8199, C8196), have thicknesses of 4 × 7, 4 × 8, and 5 × 10 mm. They are all loosely braided pieces of sennit (*kawa wili yaeyae*).

Canoe lashing sennit C8103 (*kawa unu ki vaka*) is a fine three-ply braid, in which each ply is composed of 13 long coconut fibers. Short plies are lengthened by direct overlapping, the slight backward projection of the short end of the added strand being trimmed off later. The finished braid is 3 mm thick, 6 mm wide; the flatness and strength of this braid make it ideal for lashing together hull parts.

Five-ply (*wili lima*) braiding is reserved exclusively for the making of sennit malos (*kawa malo*). The braiding technique is similar to three-ply braiding save that the outer ply from either side crosses two plies instead

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of one ply in passing over to the middle position. The under surface of the five-ply braid is termed *aloalo* and is marked by a pronounced transverse concavity. Shreds of coconut fiber left by the braiding are not cut off but are left, presumably to ease the rub of the malo against the skin. The outer surface (*tua*) of the malo is flat and smooth because the shreds are cut off. Braiding is very tight and strong. Informants mentioned that the utmost a good worker could braid each day was about 12 inches, and from this his hands became roughened and torn by tugging at the braiding to make it tight.

A sennit malo observed in the field was of five-ply braid, 33 feet long, ¾ inch wide, and ⅜ inch thick. The commencement end (*kamatanga*) consisted of a two-ply twisted loop, 1¼ inches long. This loop was hitched over a bracing stick in braiding and the four ends braided as a four-ply braid for 1 inch. A fifth ply was then added and the rest of the malo braided five-ply. The finishing end (*mokootinga*) was fastened with an overhand knot, and a length of two-ply twisted sennit, 4 feet long, 1/16 inch in diameter, was knotted to this end. This length of twisted sennit (*kowa li malo*) is used to secure the malo to the waist when worn or to fasten it in a flat disc when stored.

Malo C8146 is made of two shorter lengths of five-ply sennit joined together by knotting. One section of the sennit is ½ inch wide, 3/16 inch thick; the other section ¼ inch wide, ⅛ inch thick. A malo is wound for storage in the shape of a disc (*iko*, pl. 3*C*). The malo is laid on the ground, the commencement end folded in and the rest of the sennit wound round this core to produce a flat disc 11 inches in diameter. The turns are held together by the *kowa li malo* cord which passes from the circumference through the center hole of the disc and back to the circumference again where it is looped round the first turn. The free end is passed round the circumference for 3 inches, then passed down to the center hole, and back to the circumference again, these turns being repeated at every third inch round the circumference.

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The ordinary, quickly made, climbing bandage (*koanga*) is made from strips of coconut midrib (*kalava*), chewed to soften the fibers, and then looped by fastening the ends with a reef knot. The coconut climbing bandage (C8057), *koanga kake niu* (climbing bandage to climb coconut tree), is 30 inches long, 5/16 inch thick. More permanent and stronger bandages, braided from pandanus roots, are used by a bird catcher who wishes to be sure that a bandage will not break and throw him to the ground during the several hours he remains in a coconut tree. Young aerial roots of the *yulu* species of pandanus are cut as long as possible and baked in the oven or heated over a fire. The roots are pounded with a piece of wood until the fibers are soft and flexible. Strands of this material are made into a three-ply braid, the ends knotted to form a loop. Climbing bandage C8159, (*koanga yulu*) is three-ply braid, 45 inches long, ¾ inch wide and ⅜ inch thick.

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Men today spend much of their time at braiding sennit and *nuo* fiber for ropes and fishlines. When the price of copra was high, many European fishlines and ropes were in use, but low copra prices have sent the men back to native materials though they consider cordage making a laborious job.

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CLOTHING

291/177 The Pukapukans today wear European dress termed *kakau* (coverings). Formerly the everyday dress of the man was the *malo launiu* of plaited coconut leaf; that of the woman, the coconut leaf kilt (*titi launiu*). These articles of clothing were called generically *wakakawu*; any clothing or ornament attached to the waist was called *lulu tuku'pu*. In general clothing was worn below the hips. Today men retain this pattern in the way they fasten trousers below the hips.

The technique of making the man's coconut-leaf malo has been given (p. 141). To wear the malo, the strings are tied round the waist, the body of plaited material is placed over the genitals, and the braided tail is passed between the legs and fastened to the strings at the back. The woman's kilt of coconut leaf reaches to the knees.

294 The kilt is made by splitting leaflet-carrying strips of appropriate length from the butt end of the coconut leaf. The strips are made thin and soft by tearing off superfluous fibers with the teeth and by chewing. Four of these strips are placed together in pairs, with the rough side of the strips in juxtaposition. The two pairs of strips are tied together at 3-inch intervals with strips of midrib fiber (*kalavu*). Each leaflet is split longitudinally by removing the leaflet midrib (*tua*), and may be split again any number of times with the thumb nail. A length of two-ply twisted sennit is tied to each end of the midrib strip waistband by which the kilt is fastened round the waist. There is no record that the leaflets of the kilt were ever plaited or braided together. Kilt C81pa conforms in all particulars to the above description.

293/283 Back supports of twisted fiber are sometimes worn. Formerly these girdles were made of the bark of the *wulo* tree.

The bark was removed from the trunk of the tree and soaked in salt water for about two weeks. Strips of bark were then cut to the appropriate length and width and soaked in fresh water until the bark was white and tough. Dyed red, the bark was used as streamers for ornamental headdresses. Left white and twisted into a cord termed *matai wulo*, it was used to make the champion's ring at a wrestling contest or was wound round the waist (*pepelu ki te matai wulo*) to support the back against strains. Today mourners sitting round a corpse for 24 hours or longer tie a sennit cord round the waist to support the back against the strain of continuous sitting.

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291 Sandals of elaborate type are unknown. But when, after prolonged reef fishing, the soles of the fisherman become very soft from long immersion in water, he may strip coconut leaf stipule (*kaka niu*) from a tree by the beach, fold these strips to a suitable thickness, and tie them on his feet with lengths of coconut midrib fiber (*kalavu*). These foot coverings, termed descriptively *wakamalu vae* (foot soothers), were worn over the sharp and hot coral until the soles hardened again.

Uncovered heads are exposed to the sun only for short periods. Adults who are to be out in the sun for some time invariably wear hats or make a rough head covering out of coconut leaves. No eye shade was or is worn to protect the eyes from the glare of the sun.

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were shorter than those made of sennit and were therefore worn more as ornaments than as protective clothing.

Both the malo of sennit and the malo of pandanus are greatly valued today in terms of sentiment and scarcity. No longer being made, they are the greatest heirloom that a man can hand on to his son. Sennit malo C8146 was procured from a childless man who felt he had no further use for it. During the confessional held as a last desperate attempt to save the life of an only male child, the sennit malo that the child would inherit was hung from the house tiebeams as if its highly charged sentimental value might help the child to hold onto life (p. 338).

Informants suggested that the hands of contemporary Pukapukans are different from those of ancient Pukapukans and that therefore the art of making the very tight five-ply braid of the sennit malo has been lost. But, as both malos might be classed by missionaries as heathen garments, there is no longer sufficient incentive in the culture to take the trouble to make them.

The art of making the poncho-like garment (*la kupenga*) worn by men above the pandanus malo has been lost, but from informant's description it seems that it is plaited of fine strips of *hie* pandanus material. Three or four elements were plaited as a single element (*langa tolu* or *langa wa*). The garment was rectangular, falling to the waist at front and back. The neck hole was either square or roughly V-shaped. Hanging ends were fringed with strips of *hie*, and the garment was fastened with strings of *welo* cord (*matai welo*) on either side, one pair of strings under the arms, another pair at the waist. Informants felt that there was no status associated with the wearing of this garment, but it was worn on festive or ceremonial occasions by anyone whose wife or relative had acquired the technique of plaiting it from a dream in which familiars came from the Underworld to teach it. The following lines of an old chant were quoted to prove the antiquity of the garment:

Wakakawaa ki te la kupenga	Clothed in the *la kupenga*
Tuputupu a Yiva angaoti	Made as in Yiva (legendary land) certainly,
Yongia ona wakaeveevenga.	Smelled its fringe.

Informants said that a Pukapukan man returned from the land of Yiva where the art of making *la kupenga* was also known. He was wearing a foreign-made *la kupenga* when he landed. The people went to greet him and some pressed the fringe of the garment to their noses. This fringe had the smell of a foreign land or of a foreign people. It may be inferred perhaps that the garment was introduced into Pukapuka from the land of Yiva and never became a common article of wear, its use dying out rapidly when the Pukapukans acquired European garments.

Corresponding to the *la kupenga* worn by men was a sort of short cape (*yea*) worn by women. The art of making the *yea* has been lost today.

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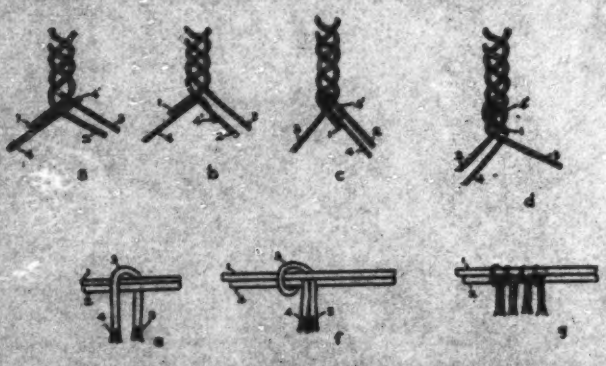
292 padded conical hat obviously not made of netting. There is no information available as to the material from which this hat is supposed to have been made nor of the method of manufacture. Gill's hat may represent an artist's conception of the sennit netted hat of the chief.

286 294 Hat C8094 (*taumata kanu*) is made of two-ply twisted sennit netted into a conical shape (pl. 4,*d*). The technique of the netting is the same as that for ordinary fishnets (p. 207). The meshes are ¾ inch wide. The rim of the hat is made of a thin strip of coconut midrib ¾ inch wide which is bent into a circle of 7¾ inch diameter and the two ends bound together with sennit. Six vertical strips of midrib, each 8½ inches long, are bound at equal intervals to the rim. The distal ends of these strips are notched, gathered together to form the apex of the cone and fastened together with figure-of-eight turns of sennit. The rim strip and two bracing circular strips of midrib, one strip 2½ inches from the rim, the other 4½ inches from the rim, are passed through the meshes of the hat material and bound to the vertical bracing strips by transverse turns of sennit. A 6-inch fringe is attached to the hat. Fringe material is made by fastening coconut fiber (*kaukaunu*) to a base strip of pandanus (fig. 18,*e-g*). Two strips of fringe each



283 294 FIGURE 18.—Braiding and fringing technique: *a-d*, braiding; *e-g*, fringing technique (*sasu sukalakalaka*, made to bend over) for sennit hat. *a*, three-ply sennit braid, end of ply (1) either short or thin, making it necessary to join to it another strand; ply 1 brought to left and renewal strand (4, 4′) laid alongside 1, under ply 2; short end 4′ placed over ply 3. *b*, short end 4′ folded down and along ply 2. *c*, ply 3 brought across ply 2 and short end of ply 4′, locking this short end in position; ply 1 and ply 4, working together as single ply, brought across from outside to pass over ply 3. *d*, short end (4′) of added ply securely locked; ply 2 passes over plies 1, 4; ply 3 passes over 2 and ply 4 passes again across 3; continuation of braiding makes join in plies barely perceptible save under closest scrutiny. *e*, strand (*aano*) of coconut-husk fibers about 12 inches long, doubled (3) over two strips of pandanus material (*laumala fakapaka*) (1, 2) which are knotted together at one end and looped over toe, forming near limb (4) and far limb (5). *f*, both limbs (4, 5) brought up between two strips (1, 2), passed over lower strip (2), and pulled tight. *g*, strands of fiber added successively to right; pulled tight and kept close together; pandanus strips (1, 2) hidden by turns; fibers of strands indicated by light shading of strand ends (4, 5). Pukapukan technique inverts Manihikian technique noted by Buck (29, p. 135, fig. 47).

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about the hull joins is seldom dry, and after about 10 years the wood becomes so rotten that the flanges break apart. The only remedy is to take the canoe apart, adz off the rotten sections of wood, and rejoin the canoe as a *vaka tui tuta*. The sennit lashing of the *vaka tui tuta* lasts about seven years before it rots. It is easily replaced if care has been taken of the canoe and the wood round the joins has not become rotten through unsuspected water seepage.

The customary Pukapukan canoe for deep-sea fishing or voyaging was the single outrigger canoe. At various times, however, the double canoe (*tauluo*) was made and used, particularly for regular fishing trips to Tima Reef. A time is remembered when three double canoes were in commission on the atoll. Tradition seems to indicate that the art of making double canoes was introduced by returning Pukapukan navigators. The chief Wue (who lived about 14 generations ago) is reputed by some to have been the first man to build a double canoe in Pukapuka; he modeled it after one he had seen in his travels abroad. Lack of sufficiently large timber is given as the reason why few double canoes were built. No informant had seen a Pukapukan double canoe. The following brief description is based on traditional information only:

The larger of the two canoes was to leeward and carried the two masts. The smaller canoe acted as an outrigger and was to windward. Cross booms (*kaukau*) joining the two canoes were probably logs of pandanus, three booms being necessary to provide a stable support. Both canoes were completely decked with logs of *pupuu* wood, save for holes or hatchways that served as bailing cockpits and gave entrance to stores and fishing gear loaded inside the hull of the windward canoe. Diagonal cross braces from the stern and bow of each canoe to the fore and aft cross booms were termed *tahei*. A platform (*papanga tauluo*) laid across the booms was occupied by the crew and passengers who also used the leeward canoe for shelter. On one part of the platform was placed a small house which functioned as a god house (*maki atua*). No details are preserved of lashings or sizes of these double canoes. But it is likely that the reason the single outrigger was the preferred canoe is that it could be made more seaworthy because the outrigger could be more strongly lashed to the hull than on the big and unwieldy double canoe. The double canoe was steered by two or three steering paddles, one man steering from one canoe and the second man from the platform between the canoes. Should a sudden turn be desired, the two steersmen were reinforced by a third who assisted from the stern of the second canoe.

To change the direction of any canoe is *wuli* or *uuwuli*. The change of direction is to starboard (*ki hatea*) or to port (*ki ama*). The bowman calls out the direction of change thus: *La amaí* or *La hatea*! When the required direction is defined, he calls out: *Tawi ai*! (Hold it now!)

Variations on the fundamental construction pattern of the Pukapukan canoe are few:

In one single-piece dugout canoe, rather large for its type, greater stability was given to the two outrigger cross booms by projecting the ends of these booms about 18 inches beyond the starboard side of the hull and lashing to these ends a longitudinal